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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,389	10/26/2001	Jan Martijn Krans	PHNL000578	4613

25784 7590 06/18/2003

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EXAMINER

JOHNSTON, PHILLIP A

ART UNIT	PAPER NUMBER
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2881

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/043,389

Applicant(s)

KRANS ET AL.

Examiner

Phillip A Johnston

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Detail of Action***

1. The reply filed on 4-11-2003 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s):

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Europe on 10-31-2000. It is noted, however, that applicant has not filed a certified copy of the application (No. 00203786.9) as required by 35 U.S.C. 119(b).

***Claims Rejection – 35 U.S.C. 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, are rejected under 35 U.S.C. 102(b), as being anticipated by U.S. Patent No. 5,894,124 to Iwabuchi et al.

Iwabuchi (124) discloses that the device of the present invention enables high resolution observation even when a sample is tilted. A deflecting electrode device for

generating an electric field having a component in the direction perpendicular to the center axis (optical axis) of an objective lens is provided between the objective lens and the sample. A voltage applied to the deflecting electrode device is controlled in accordance with the tilting of a sample stage. A lateral electric field component generated on the optical axis when the sample stage is tilted is corrected by a deflected electric field generated by the deflecting electrode device. This is effective to suppress generation of astigmatism, and to allows effective arrival of an secondary electron at a secondary electron detector disposed at a position nearer the electron source side than the objective lens. See Abstract.

Iwabuchi (124) also discloses an SEM that includes an electron gun for generating an electron beam; an objective lens converging the electron beam to a sample so as to allow emission of the electron beam on the sample; a means for deflecting the electron beam so as to allow the electron beam to scan the sample; a means for generating an electric field having a component in the direction of the optical axis of the electron beam so as to extract, through said objective lens, a secondary electron generated from the sample by emission of the electron beam; a detector for detecting the extracted secondary electron; a means for tilting the sample with respect to the electron beam; and a means for correcting a nonaxisymmetric property, due to the tilting of the sample, of the electric field applied to the electron beam to be emitted on the sample; wherein the nonaxisymmetric property correcting means includes a deflecting electrode device to

which a variable voltage is applied for generating an electric field having a component in the direction perpendicular to the optical axis of the electron beam.

In the above scanning electron microscope and its analogous device, the deflecting electrode device may include at least two pieces of electrodes disposed between said objective lens and the sample in such a manner as to be positioned around the optical axis of the electron beam. See Column 2, line 8-37.

Iwabuchi (124) further discloses that after passing through the objective lens 6, the primary electron beam 2 is returned to the original state, that is, it has the original accelerating voltage, so that the sample can be prevented from being damaged by a highly accelerated primary electron beam. A deflecting electrode device 17 is composed of two electrodes 19, 20 symmetrically disposed with respect the optical axis of the electron beam, as shown in FIG. 2. Different voltages, which are respectively applied to the electrodes 19, 20, are controlled by a control unit 18 in accordance with the tilting of a sample stage 10 mounting the sample 8. The suitable selection of these voltages enables generation of an electric field component being large sufficient to compensate for an irregular electric field component generated in the direction perpendicular to the axis of the electron beam due to the tilting of the sample. This is effective to correct the nonaxisymmetric property, due to the tilting of the sample, of the electric field applied to the electron beam, and hence to suppress generation of astigmatism as a cause of lowering of resolution. See Column 4, line 16-35.

Iwabuchi (124) also shows in Figure 3, an arrangement example of the deflecting electrode device 17, in which the device 17 is arranged between the lower surface of the objective lens 6 and a sample in such a manner as to be positioned around the optical axis of an electron beam. As shown in FIGS. 2, 4 or 5, the deflecting electrode device 17 may be composed of two, four or eight electrodes for applying different voltages. See Column 5, line 15-21.

### ***Claims Rejection – 35 U.S.C. 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-5, are rejected under 35 U.S.C. 103(a), as being unpatentable over U.S. Patent No. 5,894,124 to Iwabuchi et al, in view of Sato, U.S. Patent No. 5,149,968.

Iwabuchi (124) discloses that the device of the present invention enables high resolution observation even when a sample is tilted. A deflecting electrode device for generating an electric field having a component in the direction perpendicular to the center axis (optical axis) of an objective lens is provided between the objective lens and the sample. A voltage applied to the deflecting electrode device is controlled in accordance with the tilting of a sample stage. A lateral electric field component generated on the optical axis when the sample stage is tilted is corrected by a deflected electric field generated by the deflecting electrode device. This is effective to suppress generation of astigmatism, and to allows effective arrival of an secondary electron at a secondary electron detector disposed at a position nearer the electron source side than the objective lens. See Abstract.

Iwabuchi (124) also discloses an SEM that includes an electron gun for generating an electron beam; an objective lens converging the electron beam to a sample so as to allow emission of the electron beam on the sample; a means for deflecting the electron beam so as to allow the electron beam to scan the sample; a means for generating an electric field having a component in the direction of the optical axis of the electron beam so as to extract, through said objective lens, a secondary electron generated from the sample by emission

of the electron beam; a detector for detecting the extracted secondary electron; a means for tilting the sample with respect to the electron beam; and a means for correcting a nonaxisymmetric property, due to the tilting of the sample, of the electric field applied to the electron beam to be emitted on the sample; wherein the nonaxisymmetric property correcting means includes a deflecting electrode device to which a variable voltage is applied for generating an electric field having a component in the direction perpendicular to the optical axis of the electron beam.

In the above scanning electron microscope and its analogous device, the deflecting electrode device may include at least two pieces of electrodes disposed between said objective lens and the sample in such a manner as to be positioned around the optical axis of the electron beam. See Column 2, line 8-37.

Iwabuchi (124) further discloses that after passing through the objective lens 6, the primary electron beam 2 is returned to the original state, that is, it has the original accelerating voltage, so that the sample can be prevented from being damaged by a highly accelerated primary electron beam. A deflecting electrode device 17 is composed of two electrodes 19, 20 symmetrically disposed with respect the optical axis of the electron beam, as shown in FIG. 2. Different voltages, which are respectively applied to the electrodes 19, 20, are controlled by a control unit 18 in accordance with the tilting of a sample stage 10 mounting the sample 8. The suitable selection of these voltages enables generation of an electric field component being large sufficient to compensate for an irregular electric field component generated in the direction perpendicular to the axis of the electron



beam due to the tilting of the sample. This is effective to correct the nonaxisymmetric property, due to the tilting of the sample, of the electric field applied to the electron beam, and hence to suppress generation of astigmatism as a cause of lowering of resolution. See Column 4, line 16-35.

Iwabuchi (124) also shows in Figure 3, an arrangement example of the deflecting electrode device 17, in which the device 17 is arranged between the lower surface of the objective lens 6 and a sample in such a manner as to be positioned around the optical axis of an electron beam. As shown in FIGS. 2, 4 or 5, the deflecting electrode device 17 may be composed of two, four or eight electrodes for applying different voltages. See Column 5, line 15-21.

Iwabuchi (124) disclosed nearly all the limitations of Claims 1-5 above, but did not disclose an "electrode being situated completely to one side of the optical axis", as recited in Claim 5. Sato (968); however, discloses an automatic control apparatus to optimize secondary electron collection, which the cylinder controller 53 controls the air cylinder 16 in such a fashion that when the acceleration voltage 50 is less than the reference voltage 51, the shield electrode 11 is moved to the position shown in FIG. 2A and when the acceleration voltage 50 is above the reference voltage 51, the shield electrode 11 is moved to the position shown in FIG. 2B. Accordingly, the operator can always make the observation under the optimum state without considering the acceleration voltage. See Column 4, line 24-39.

Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Iwabuchi (124) SEM with the movable electrode

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of Sato(968) to further suppress generation of astigmatism as a cause of lowering of resolution.

6. Applicant's arguments filed 4-11-2003 have been fully considered but they are not persuasive.

#### Argument 1. Rejections for obviousness type double patenting

Applicant states, that " Regarding the provisional obviousness type double patenting rejections over U.S. Pub. No. 2002/0125428A1 and U.S. Pub. No. 2002/0079449, applicant expects the rejection will be withdrawn in accordance with MPEP 8041(B) when the application is otherwise found to be allowable."

Regarding the obviousness-type double patenting rejection over U.S. Pat. No. 6,194,525 (the '525 patent), applicant submits that claims 1-5 of the present invention are not obvious over the claims of '525 patent. The '525 patent describes an environmental SEM with a magnetic final lens, which is quite a different configuration from the claims of the present application. For example, the claims of the present application recite detection means "arranged ahead of the focusing device, viewed in the propagation direction of the electrically charged particles in the Primary beam." The claims of the '525 patent recite a "detection electrode for generating an electric field in the space between the detection electrode and the specimen holder." Similarly, claim I of the '525 patent recites magnetic immersion lens, whereas claim I of the present invention recites "a focusing device (14, 16) for forming a focus of the primary beam in the vicinity of the specimen holder by means of electrostatic electrode,"

Regarding the obviousness type double patenting rejection over U.S. Pat. No. 6,218,664 (the '664 patent), applicant submits that claims 1-5 of the present invention are not obvious over the claims of '664 patent. The invention of the present application solves the problem of how to use voltage contrast to enhance imaging, while still efficiently collecting secondary electrons. Voltage contrast is not discussed in the '664 patent. Claim I of the present application recites "power supply means (28) for adjusting a potential difference between the specimen (18) to be irradiated by means of the apparatus and the final electrode." The claims of the '664 patent do not recite a power supply for adjusting a potential difference between the specimen to be irradiated and the final electrode. Moreover, the specification of the '664 patent indicates that the specimen 18 is grounded (Col. 4, line 18) and the '664 patent does not describe adjusting the voltages of the specimen. Applicant submits therefore that claims 1-5 of the present application are not obvious over the claims of the '664 patent and respectfully requests that the rejection be withdrawn".

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7. The Examiner withdraws the double patenting rejection over U.S. Pat. No. 6,194,525 and U.S. Pat. No. 6,218,664.

However, Claims 1-5 stand as provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 of copending Application No. 10011618 and claims 1-5 of copending Application No. 10024777.


### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (703) 308-4116. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ

June 3, 2003

  
JOHN R. LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2000